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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,870	04/14/2004	John Philip MacCormick	226107	6179

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EXAMINER

MYINT, DENNIS Y

ART UNIT PAPER NUMBER

2162

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/823,870	Applicant(s) MACCORMICK, JOHN PHILIP	
	Examiner Dennis Myint	Art Unit 2162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>04/14/2004</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-26 have been examined.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 7, 9, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiter et al., (hereinafter "Reiter") (U.S. Patent Number 5752243) in view of Bumbulis (hereinafter "Bumbulis") (U.S. Patent Application Publication Number 2003/0204513).

As per claim 1, Reiter is directed to a method of changing values of a range of consecutive keys in an original B-tree having a plurality of keys stored therein (Figure 8; Column 10 Lines 36-40, i.e., *horizontal splitting*; and Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*), comprising:

"excising the range of consecutive keys from the original B-tree, the excision of the range of consecutive keys converting the original B-tree into a trimmed tree" (Figure

Art Unit: 2162

8; Column 10 Lines 36-40, i.e., *horizontal splitting*; and Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*); Note that horizontal splitting would excise a range of consecutive keys from a original B-tree and would convert the original B-tree into a trimmed tree;

"storing the range of consecutive keys excised from the B-tree to form an extracted tree" (Column 9 Lines 32-43, i.e., *the tree manager moves a subset of the page's node entries to a new adjacent page*); and

"changing the values of the keys of the extracted tree to form a modified extracted tree" (Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*).

Reiter does not explicitly teach the limitation: "inserting the modified extracted tree into the trimmed tree to form a final B-tree".

Bumbulis teaches the limitation: "inserting the modified extracted tree into the trimmed tree to form a final B-tree" (Paragraph 0115, i.e., *The merge operation is the inverse of the split operation*; Paragraph 0151; Paragraph 0155, i.e., *A merge starts by copying the nodes for the left and right trees into consecutive locations*).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the method of Reiter, which performs horizontal splitting and renaming of nodes of a subtree that was split, with the method of Bumbulis, which merges back the split trees, so that the combined method would excise a range of consecutive keys from an original B-tree, converting the original B-tree into a trimmed tree; store the range of consecutive keys excised from the B-tree to form an extracted tree; change the values of the keys of the extracted tree to form a modified extracted tree; and insert the modified extracted tree into the trimmed tree to form a final B-tree. One would have been motivated to do so in order to *enable a database management system to maintain more compact indexes while providing performance equivalent to existing indexing schemes* (Bumbulis, Paragraph 0022).

As per claim 7, Bumbulis in view of Reiter teaches the limitation:

“wherein the step of changing includes changing a prefix field of a root node”
(Bumbulis, Figures 7E and 7E and Paragraph 0198, i.e., *Fig. 7D illustrates a ptree 730 after insertion of a node y having a key value key (y) = prefix (c) 0 into the ptree 710 of Fig 7A*) “of the extracted tree” (Reiter, Figure 8; Column 10 Lines 36-40, i.e., *horizontal splitting*; and Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*).

Claim 9 is rejected on the same basis as claim 1.

Claim 15 is rejected on the same basis claim 7.

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4. Claims 2-4, 10-12, 17, 18, 21, 22, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiter in view of Bumbulis and further in view of Rao et al., (hereinafter "Rao") (U.S. Patent Number 5689706).

As per claim 2, Reiter in view of Bumbulis does not explicitly teach the limitation: "wherein the original B-tree represents a hierarchical namespace".

Rao teaches the limitation: "wherein the original B-tree represents a hierarchical namespace"(Column 7 Lines 49-59, i.e., **name space 405**; *the delete function checks whether information about the deleted file needs to be removed from frond end replicated tree 505*; and Column 14 Lines 1-15, i.e., *namespace 405; there is also an unmount operation which removes replicated tree entry 1017 having the specified pathname from replicated tree 1015*).

At the time the invention was made, it would have been obvious to a person or ordinary skill in the art to add the feature of having a tree which represents hierarchical namespace, as taught by Rao, to the method of Reiter in view of Bumbulis so that in the resultant method would the original B-tree would represent a hierarchical namespace. One would have been motivated to do so because the use of B-trees representing hierarchical namespace is notoriously well known in the art.

As per claim 3, Reiter in view of Bumbulis and further in view of Rao teaches the limitations:

"wherein the original B-tree represents a hierarchical namespace of a file system" (Rao, Column 7 Lines 49-59, i.e., **name space 405**; *the delete function checks whether information about the deleted file needs to be removed from frond end replicated tree 505*; and Column 14 Lines 1-15, i.e., *namespace 405*; *there is also an unmount operation which removes replicated tree entry 1017 having the specified pathname from replicated tree 1015*), and "the range of consecutive keys belong to a directory of the file system, and wherein the changing of the values of the range of consecutive keys is in connection with the directory being renamed" (Reiter, i.e., *A hierarchical data model is one in which units of data are associated in a multidimensional parent-child relationship. In a file system, for example, files and subdirectories descend from a main directory*; and Reiter, Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*). In the combined method of Reiter in view of Bumbulis and further in view of Bumbulis, horizontally split nodes would represent directories (Reiter in view of Rao).

As per claim 4, Reiter in view of Rao teaches the limitation:

"wherein each key in the original B-tree contains a pathname for a file or directory of the file system prior to the renaming of the directory" (Reiter, Column 9

Lines 32-43, i.e., *key value and pointer*; and Rao, Column 11 Lines 52-67, i.e., *by means of a pathname of the directory*).

Claims 10-12 are rejected on the same basis as claims 2-4 respectively.

As per claim 17, Reiter in view of Bumbulis and further in view of Rao teaches the limitations:

"excising keys of the directory being renamed from the B-tree, the excision of the keys of the directory converting the B-tree into a trimmed tree" (Reiter, Figure 8; Column 10 Lines 36-40, i.e., *horizontal splitting*; and Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*; Note that horizontal splitting would excise a range of consecutive keys from a original B-tree and would convert the original B-tree into a trimmed tree; Rao, Column 7 Lines 49-59, i.e., **name space 405**; *the delete function checks whether information about the deleted file needs to be removed from frond end replicated tree 505*; and Column 14 Lines 1-15, i.e., *namespace 405; there is also an unmount operation which removes replicated tree entry 1017 having the specified pathname from replicated tree 1015*; In the combined method of Reiter in view of Bumbulis and further in view of Bumbulis, horizontally split nodes would represent directories (Reiter in view of Rao);

“storing the keys of the directory excised from the B-tree in an extracted tree” (Reiter, Column 9 Lines 32-43, i.e., *the tree manager moves a subset of the page’s node entries to a new adjacent page*);

“changing the values of the keys of the extracted tree to reflect a new name of the directory” (Reiter, Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page’s node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*; Rao, Column 7 Lines 49-59, i.e., *name space 405; the delete function checks whether information about the deleted file needs to be removed from frond end replicated tree 505*; and Column 14 Lines 1-15, i.e., *namespace 405; there is also an unmount operation which removes replicated tree entry 1017 having the specified pathname from replicated tree 1015*; In the combined method of Reiter in view of Bumbulis and further in view of Bumbulis, horizontally split nodes would represent directories (Reiter in view of Rao)); and

“inserting the extracted tree with changed values of the keys into the trimmed tree to form a final B-tree” (Bumbulis, Paragraph 0115, i.e., *The merge operation is the inverse of the split operation*; Paragraph 0151; Paragraph 0155, i.e., *A merge starts by copying the nodes for the left and right trees into consecutive locations*).

At the time the invention was made, one would have been motivated to combine the feature of performing horizontal splitting and renaming of nodes of a subtree that was split, as taught by Reiter, the feature of merging/inserting back split trees, as taught by Bumbulis, and the feature of having a tree which represents

hierarchical namespace, as taught by Rao so that the resultant method would teach all the limitations of instant claim 17. One would have been motivated to do so in order to *enable a database management system to maintain more compact indexes while providing performance equivalent to existing indexing schemes* (Bumbulis, Paragraph 0022) and because the use of B-trees representing hierarchical namespace is notoriously well known in the art

Claim 18 is rejected on the same basis of claim 4.

As per claim 21, Bumbulis in view of Reiter teaches the limitation:

“ wherein the step of changing includes changing a prefix field of a root node”

(Bumbulis, Figures 7E and 7E and Paragraph 0198, i.e., *Fig. 7D illustrates a ptree 730 after insertion of a node y having a key value key (y) = prefix (c) 0 into the ptree 710 of Fig 7A*) “of the extracted tree” (Reiter, Figure 8; Column 10 Lines 36-40, i.e., *horizontal splitting*; and Column 9 Lines 32-43, i.e., *Generally, to split a page horizontally, the tree manager moves a subset of the page's node entries to a new adjacent page and stores a new key value and a pointer to the new page in the parent page to the page being split*).

Claim 22 is rejected on the same basis as claim 17.

Claim 23 is rejected on the same basis as claim 18.

Claim 26 is rejected on the same basis as claim 21.

5. Claims 5, 6, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiter in view of Bumbulis and further in view of Li et al., (hereinafter "Li") (U.S. Patent Application Publication Number 2002/0198891).

As per claim 5, Reiter in view of Bumbulis does not explicitly teach the limitation: "including the step of balancing the trimmed tree prior to the step of inserting".

Li teaches the limitation:

"including the step of balancing the trimmed tree prior to the step of inserting" (Paragraphs 0117-0118, i.e., *may involve splitting and balancing the tree; may involve merging and balancing the tree*).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to add the feature of balancing trees prior to merging (inserting) to the method of Reiter in view of Bumbulis so that the resultant would comprise balancing B-trees. One would have been motivated to do so because tree-balancing is notoriously well known in the art.

Claim 6 is rejected on the same basis as claim 5.

Claims 13 and 14 are rejected on the same basis as claim 5 and 6 respectively.

6. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiter in view of Bumbulis and further in view of Cheng et al., (hereinafter "Cheng")

(U.S. Patent Number 5204958) and further in view of Beyer et al., (hereinafter "Beyer") (U.S. Patent Application Publication Number 2006/0173927).

As per claim 8, Reiter in view of Bumbulis does not explicitly teach the limitation: "wherein the step of inserting the modified extracted tree into the trimmed tree involves a strict insertion".

Cheng teaches the limitation: "inserting the modified extracted tree into the trimmed tree" (Column 11 Lines 33-45, i.e., *could be inserted between the memory resident small B-tree SBT148 and the large B-tree 132*; Note that the disk on which these trees reside itself a large tree) and Beyer teaches the limitation: "strict insertion" (Figure 1 and Paragraph 0022-0024, and particularly Paragraph 0017, i.e., *still maintain these properties*).

At the time the invention was made, it would have been obvious to a person ordinary skill in the art to add the feature of inserting a tree into another tree, as taught by Cheng, and the feature of maintaining key values (i.e. ID values and relationships among nodes), as taught by Beyer, to the method of Reiter in view of Bumbulis so that the resultant method would comprise the step of inserting the modified extracted tree into the trimmed tree involves a strict insertion. One would have been motivated to do so in order to *enable a computer system to perform high frequencies inserts into the indexes of large databases* (Cheng, Column 2 Lines 40-45) and to *maintain/retain the order and relationships between the parent, child, sibling nodes* (Beyer, Paragraph 0015).

Claim 16 is rejected on the same basis as claim 8.

7. Claims 19 and 20^{24 and 25} are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiter in view of Bumbulis, further in view of Rao and further in view of Li.

As per claim 19, Reiter in view of Bumbulis and further in view of Rao does not explicitly teach the limitation: "including the step of balancing the trimmed tree prior to the step of inserting".

Li teaches the limitation:

"including the step of balancing the trimmed tree prior to the step of inserting"
(Paragraphs 0117-0118, i.e., *may involve splitting and balancing the tree; may involve merging and balancing the tree*).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to add the feature of balancing trees prior to merging (inserting) to the method of Reiter in view of Bumbulis so that the resultant would comprise balancing B-trees. One would have been motivated to do so because tree balancing is notoriously well known in the art.

Claim 20 is rejected on the same basis as claim 19.

Claims 24 and 25 are rejected on the same basis as claim 19 and 20 respectively.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure is as follows.

U.S. Patent Number 5619693 (Troisi)

U.S. Patent Number 5832487 (Olds et al.,)

U.S. Patent Application Publication Number 2003/0018646 (Ohta et al.)

U.S. Patent Application Publication Number 2004/0205536 (Newman et al.)

U.S. Patent Application Publication Number 2002/0188598 (Myllymaki)

U.S. Patent Number 7103838 (Krishnamurthy et al.)

U.S. Patent Number 6675157 (Mitchell)

Contact Information


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Myint whose telephone number is (571) 272-5629. The examiner can normally be reached on 8:30AM-5:30PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 571-273-5629.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dennis Myint

AU-2162


Camy Thiong
primary Examiner